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(54) ISOLATION RING FOR ISOLATING END WINDINGS OF A STATOR GENERATOR FOR A HYBRID ELECTRIC VEHICLE

ISOLATIONSRING ZUR ISOLIERUNG VON STATORWICKLUNGEN EINES STATORGENERATORS FÜR EIN ELEKTRISCHES HYBRIDFAHRZEUG

ANNEAU D'ISOLATION PERMETTANT D'ISOLER DES ENROULEMENTS D'EXTRÉMITÉ D'UN STATOR GÉNÉRATEUR DESTINÉ À UN VÉHICULE ÉLECTRIQUE HYBRIDE

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Description

[0001] The inventions concerns to an isolation ring for isolating the end windings of a stator of an electrical machine, comprising a support for arranging a temperature sensor. Hence an accurate temperature detection of the coil winding can be achieved. Preferably, the electrical machine relates to a belt starter generator of a hybrid electric vehicle.

[0002] In a rotating electric machine, a coil winding is provided on a stator or a rotor. An electric current flows to the coil winding, when the rotating electric machine is driven. As a result, a conductor of the coil winding generates heat based on the electrical resistance of the conductor, and then the temperature of the coil winding rises. Inside a 48V electrical machine, the temperature can rise as high as 180°C. Therefore, it is important to measure and/or detect the precise temperature for safe functioning of the electrical machine resp. generator.

[0003] US 2014/0191629 A1 describes a stator, wherein the stator includes a stator core, a winding and a temperature sensor. In the stator core, a plurality of slots are formed in a circumferential direction of the stator. The winding is formed by a plurality of conductors which are housed in the slots and are electrically connected. The slots are formed such that a predetermined number of the conductors are housed and arrayed in a radial direction of the stator. The temperature sensor is located in at least one of the slots and detects temperature of the conductors. Since the temperature sensor is arranged in the slot it is necessary that the sensor is reliably in contact with the conductor. Otherwise, an accurate measurement of the temperature cannot be achieved. Furthermore, the arrangement of the temperature sensor in the slots is time and cost intensive. JP 2012 053 814 A shows a ring having a protrusion for receiving a conductor end of an electrical machine and for accommodation of a temperature sensor, wherein the temperature sensor is pressed against the conductor end.

[0004] It is an object of the present invention to provide means for an accurate temperature detection of the end windings of a stator. The object is achieved by the subject matter of independent claim 1. Preferred embodiments of the invention are subject matter of the dependent claims or described hereinafter.

[0005] According to the subject matter of the invention, an isolation ring for isolating the end windings of a stator of an electrical machine is provided, comprising at least a protrusion with a conductor guide for receiving a conductor of a winding of the stator, wherein the protrusion comprises a pressing flap with an inner guiding surface, and a pocket, wherein a temperature sensor is arranged in the pocket, and wherein the inner guiding surface of the pressing flap faces the pocket, and the pressing flap and the pocket are designed and arranged in such a way that an end of a conductor, inserted in the conductor guide, is at least partially guided between the inner guiding surface and the temperature sensor, and the end of the conductor is pressed against and/or guided to the temperature sensor.

[0006] It is an aspect of the present invention that an isolation ring for isolating the end windings of a stator of an electrical machine is provided, wherein the electrical machine is preferably a starter generator of a hybrid electric vehicle. The isolation ring comprising at least a protrusion with a conductor guide for receiving a conductor of the windings, wherein the conductor is preferably a neutral bridge. It has been found out that the neutral bridge is one of the hottest area of the electrical machine. Therefore, the temperature should be measured at the neutral bridge.

[0007] The protrusion comprises a pressing flap with an inner guiding surface, and a pocket, wherein a temperature sensor is arranged in the pocket. Hence, the temperature sensor can be easily and comfortably preinstalled in the pocket of the isolation ring.

[0008] The inner guiding surface of the pressing flap faces the pocket respectively the conductor guide. The pressing flap and the pocket are designed and arranged in such a way that an end of a conductor, inserted in the conductor guide, is at least partially guided between the inner guiding surface and the temperature sensor, and the end of the conductor is pressed against and/or guided to the temperature sensor. Hence, by arranging the isolation ring on the end windings of the stator and by inserting the conductor end in the conductor guide, the conductor end is directed to and/or pressed against the temperature sensor, especially against an upper contact surface of the temperature sensor, in such a way that the conductor end is in contact with the temperature sensor. Thus, the conductor end can be easily and reliably arranged to the temperature sensor. Hence, a mean for an accurate temperature detection of the end windings of a stator is provided.

[0009] Usually, the guiding direction of the conductor guide corresponds to the axial direction of the isolation ring. Preferably, the pocket for the temperature sensor is arranged in radial direction and the inner guiding surface of the pressing flap is designed and arranged in such a way that the conductor end, inserted in the conductor guide, is at least partially guided in radial direction against the upper contact surface of the temperature sensor arranged in the pocket.

[0010] According to a preferred embodiment of the invention, the inner guiding surface is at least partially inclined with respect to the guiding direction of the conductor guide. Hence, by inserting the conductor end in the conductor guide, the end of the conductor slides along the inclined inner guiding surface. Thus, the end of the conductor can be automatically directed and pressed against the temperature sensor.

[0011] According to a preferred embodiment of the invention, the inclination of the inner guiding surface with respect to the guiding direction of the conductor, respectively to the axial direction of the isolation ring, is between

$0,5° \leq \theta \leq 15°$, preferably between $0,5° \leq \theta \leq 10°$ and more preferably between $0,5° \leq \theta \leq 5°$. An angle between $0,5° \leq \theta \leq 5°$ can be advantageously for guiding rather stiff conductors in form of pins, preferably I-pins.

[0012] In general the pocket comprises a pocket bottom facing the inner guiding surface and/or the connector guide, wherein the pocket bottom is arranged parallel with respect to the guiding direction of the conductor, respectively to the axial direction of the isolation ring.

[0013] According to a preferred embodiment of the invention, the pocket comprises a pocket bottom, facing the inner guiding surface, wherein the pocket bottom comprises an inclination. The inclination of the pocket bottom is directed in the same direction of the inclination of the inner guiding surface. Hence, when the conductor end, inserted in the conductor guide, is moved and pressed towards the temperature sensor, the conductor end can be basically arranged flat parallel to the contact surface of the temperature sensor. Hence, the contact area between the temperature sensor and the conductor can be increased, improving the accuracy for measuring the temperature.

[0014] According to a preferred embodiment of the invention, the inclination of the pocket bottom is different from the inclination of the inner guiding surface of the pressing flap. Preferably, the inclination of the pocket bottom is smaller, in general between 0,2° and 1°, than the inclination of the inner guiding surface. Depending on the deflection of the conductor end, the contact area between the conductor and the upper contact surface can be improved, leading to an increased accuracy for measuring the temperature of the windings.

[0015] According to a preferred embodiment of the invention, the inclination of the pocket bottom corresponds to the inclination of the inner surface of the pressing flap.

[0016] According to a preferred embodiment of the invention, the temperature sensor is arranged in the pocket by a form-fit connection, a force-fit connection and/or a cohesive connection. Preferably, the temperature sensor is firmly placed in the pocket by an epoxy or resin. Hence, the robustness of the sensor arrangement in the pocket and the resistance against vibrations of the conductor can be increased, since the temperature sensor sits firmly in the pocket. Furthermore, the isolation ring, including the temperature sensor can be easily and comfortably pre-manufactured. Thus, production cost can be decreased. According to a preferred embodiment of the invention, the height of the temperature sensor is larger than the depth of the pocket in a direction perpendicular to the guiding direction of the conductor guide. Hence, the contact surface of the temperature sensor facing the inner guiding surface of the pressing flap slightly protrudes in the conductor guide. Thus, by defecting the conductor end while sliding along the inner guiding surface of the pressing flap, the conductor can be easily pressed against the upper contact surface of the temperature sensor.

[0017] According to a preferred embodiment of the invention, the protrusion comprises a U-shaped design in a longitudinal section, having a longer upright bar connected to the isolation ring and a shorter upright bar which is spaced to the isolation ring, wherein the longer upright bar comprises the pocket on its inner side facing the shorter upright bar, and the shorter upright bar is designed as the pressing flap. Since the end of the pressing flap facing the isolation ring is spaced to the isolation ring, there is an opening between the end of the pressing flap and the isolation ring. Via this opening the temperature sensor can be comfortably inserted in the pocket, arranged in the longer upright bar. Hence, an easy and comfortable installation of the temperature sensor in the pocket is provided.

[0018] According to a preferred embodiment of the invention, the protrusion comprises at least a first recess and a second recess at its distal end in axial direction of the isolation ring. Hence, connection pins of the temperature sensor arranged in the pocket can be guided in the first recess and the second recess.

[0019] According to a preferred embodiment of the invention, the pressing flap is arranged between the first recess and the second recess.

[0020] According to a preferred embodiment of the invention, the isolation ring and the protrusion are designed as one piece. Preferably, the isolation ring and the protrusion are made of plastic. Hence, the isolation ring comprising the protrusion can be comfortably produced by molding in a molding tool. Thus, production cost can be decreased.

[0021] The invention further concerns to an electrical machine with a stator comprising end windings with at least one conductor, wherein an isolation ring according to the invention is arranged on the end windings, and the end of the conductor is guided in the conductor guide, and the inner guiding surface of the pressing flap presses the conductor end against the temperature sensor.

[0022] These and other aspects of the invention will be apparent from and elucidated with reference to the embodiments as per the drawings described hereinafter. In the following description, exemplary embodiments of the invention are explained with reference to the accompanying schematic drawing.

Fig. 1 shows an isolation ring with a protrusion according to a preferred embodiment of the invention,

Fig. 2 shows a detailed view of the protrusion according to the preferred embodiment of the invention,

Fig. 3 shows a longitudinal section of the protrusion with a conductor inserted in the conductor guide of the protrusion according to the preferred embodiment of the invention,

Fig. 4 shows a longitudinal section of the protrusion,

wherein the conductor is arranged in an end position and pressed against a temperature sensor, according to the preferred embodiment of the invention,

Fig. 5 shows a longitudinal section of the protrusion, wherein the conductor end is deflected and pressed against the temperature sensor, according to the preferred embodiment of the invention,

Fig. 6 shows a longitudinal section of the protrusion, wherein a pocket ground of a pocket accommodating the temperature sensor is inclined, according to the preferred embodiment of the invention.

[0023] Fig. 1 shows an isolation ring 10 for isolating end windings of a stator of an electrical machine (not shown). Preferably, the electrical machine is a 48V starter generator of a hybrid electric vehicle. The isolation ring 10 comprising at least a protrusion 12 with a conductor guide 14, configured as a slot, for receiving a conductor 16 of the windings, wherein the conductor 16 is preferably a neutral bridge. It has been found out that the neutral bridge is one of the hottest area of the electrical machine. Therefore, the temperature is measured at the neutral bridge.

[0024] A detailed view of the protrusion 12 is shown in Fig. 2. The protrusion 12 comprises a pressing flap 18 with an inner guiding surface 20, and a pocket 22, wherein a temperature sensor 24 is arranged in the pocket 22. Hence, the temperature sensor 22 can be easily and comfortably pre-installed in the pocket 22 of the isolation ring 10.

[0025] The temperature sensor 24 is arranged in the pocket 22 by a cohesive connection 25. The temperature sensor 24 is firmly placed in the pocket 22 by an epoxy or resin. Hence, the robustness of the sensor arrangement in the pocket 22 and its resistance against vibrations of the conductor 16 can be increased, since the temperature sensor 24 sits firmly in the pocket 22. Furthermore, the isolation ring 10, including the temperature sensor 24 can be easily and comfortably pre-manufactured. Thus, production costs can be decreased.

[0026] The protrusion 12 comprises at least a first recess 26 and a second recess 28 at its distal end in axial direction of the isolation ring 10. Hence, connection pins 30 of the temperature sensor 24 can be guided in the first recess 26 and the second recess 28. The pressing flap 18 is arranged between the first recess 26 and the second recess 28.

[0027] The protrusion 12 comprises a U-shaped design in the longitudinal section, having a longer upright bar 36 connected to the isolation ring 10 and a shorter upright bar 38 which is spaced to the isolation ring 10, wherein the longer upright bar 36 comprises the pocket 22 on its inner side facing the shorter upright bar 38. The shorter upright bar 38 is designed as the pressing flap 18. Since the end of the pressing flap 18 facing the isolation ring 10 is spaced to the isolation ring 10, there is an opening 40 between the end of the pressing flap 18 and the isolation ring 10. Via this opening 40 the temperature sensor 24 can be inserted and fixed in the pocket 22. Hence, an easy and comfortable installation of the temperature sensor 24 in the pocket 22 is provided.

[0028] As shown in Fig. 1 and 2, the guiding direction of the conductor guide 14 corresponds to the axial direction of the isolation ring 10. The pocket 22 for the temperature sensor 24 is arranged in radial direction. The inner guiding surface 20 of the pressing flap 18 is designed and arranged in such a way that the conductor end 32, inserted in the conductor guide 14 is at least partially guided in radial direction against an upper contact surface 34 of the temperature sensor 24.

[0029] According to Fig. 3, showing a longitudinal section through the pressing flap 18, the conductor 16 is not fully inserted to its end position in the conductor guide 14. The inner guiding surface 20 of the pressing flap 18 faces the pocket 22 respectively the conductor guide 14. The pressing flap 18 and the pocket 22 are designed and arranged in such a way that the conductor end 32, inserted in the conductor guide 14, is at least partially guided between the inner guiding surface 20 and the temperature sensor 24.

[0030] Fig. 4 shows the longitudinal section through the pressing flap 18 known from Fig. 3, wherein the conductor 16 is fully inserted to its end position in the conductor guide 14. The inner guiding surface 20 is at least partially inclined with respect to the guiding direction of the conductor guide 14. The inclination of the inner guiding surface 20 with respect to the guiding direction of the conductor 16 is $\theta \approx 5°$. Hence, by inserting the conductor end 32 in the conductor guide 14, the conductor end 32 slides along the inclined inner guiding surface 20. Thus, the conductor end is automatically directed and pressed against the upper contact surface 34 of the temperature sensor 24. Fig. 4 shows a translational movement of the conductor 16 in the direction of the temperature sensor 24, wherein the conductor end 32 is in contact with the upper contact surface 34 of the temperature sensor 24.

[0031] Fig. 5 shows the longitudinal section through the pressing flap 18 known from Fig. 4, wherein the conductor 16 is fully inserted to its end position and the conductor end is deflected and pressed at least partially against the upper contact surface 34 of the temperature sensor 24.

[0032] Fig. 6 shows the longitudinal section through the pressing flap 18 known from Fig. 5, wherein the conductor 16 is fully inserted to its end position and the conductor end is deflected and pressed against the temperature sensor 24. Furthermore, the pocket 22 comprises a pocket bottom 42, facing the inner guiding surface 20, wherein the pocket bottom 42 comprises an inclination. The inclination of the pocket bottom 42 is directed in the same direction of the inclination of the inner guiding sur-

face 20. Hence, when the conductor end 32 is moved and pressed towards the temperature sensor 24, the conductor end 32 can be basically arranged flat parallel to the upper contact surface 34 of the temperature sensor 24. Thus, the contact area between the conductor end 32 and the contact surface 34 of the temperature sensor 24 can be increased, improving the accuracy for measuring the temperature of the conductor 16.

Claims

1. Isolation ring (10) for isolating the end windings of a stator of an electrical machine, comprising at least a protrusion (12) with a conductor guide (14) for receiving a conductor (16) of a winding of the stator ,

   wherein the protrusion (12) comprises

   a pressing flap (18) with an inner guiding surface (20), and
   a pocket (22), wherein a temperature sensor (24) is arranged in the pocket (22), and wherein
   the inner guiding surface (20) of the pressing flap (18) faces the pocket (22), and the pressing flap (18) and the pocket (22) are designed and arranged in such a way that a conductor

   end (32) of the conductor (16), inserted in the conductor guide (14), is at least partially guided between the inner guiding surface (20) and the temperature sensor (24),
   wherein
   the conductor end (32) is pressed against and/or guided to the temperature sensor (24).

2. Isolation ring according to claim 1, **characterized in that** the inner guiding surface (20) is at least partially inclined with respect to the guiding direction of the conductor guide (14).

3. Isolation ring according to claim 1 or 2, **characterized in that** the inclination of the inner guiding surface (20) with respect to the guiding direction of the conductor is between $0{,}5° \leq \theta \leq 15°$, preferably between $0{,}5° \leq \theta \leq 10°$, and more preferably between $0{,}5° \leq \theta \leq 5°$.

4. Isolation ring according to one of the previous claims, **characterized in that** the pocket (22) comprises a pocket bottom (42), facing the inner guiding surface (20), wherein the pocket bottom (42) comprises an inclination.

5. Isolation ring according to claim 4, **characterized in that** the inclination of the pocket bottom (42) is different from the inclination of the inner guiding surface (20) of the pressing flap (18) .

6. Isolation ring according to claim 4, **characterized in that** the inclination of the pocket bottom (42) corresponds to the inclination of the inner guiding surface (20) of the pressing flap (18) .

7. Isolation ring according to one of the previous claims, **characterized in that** the temperature sensor (24) is arranged in the pocket (22) by a form-fit connection, a force-fit connection and/or a cohesive connection (25).

8. Isolation ring according to one of the previous claims, **characterized in that** the height of the temperature sensor (24) is larger than the depth of the pocket (22) in a direction perpendicular to the guiding direction of the conductor guide (14) .

9. Isolation ring according to one of the previous claims, **characterized in that** the protrusion (12) comprises a U-shaped design in a longitudinal section, having a longer upright bar (36) connected to the isolation ring (10) and a shorter upright bar (38) spaced to the isolation ring (10), wherein the longer upright bar (36) comprises the pocket (22) on its inner side facing the shorter upright bar (38), and the shorter upright bar (38) is designed as the pressing flap (18).

10. Isolation ring according to one of the previous claims, **characterized in that** the protrusion (12) comprises at least a first recess (26) and a second recess (28) at its distal end in axial direction of the isolation ring (10).

11. Isolation ring according to claim 10, **characterized in that** the pressing flap (18) is arranged between the first recess (26) and the second recess (28).

12. Isolation ring according to one of the previous claims, **characterized in that** the isolation ring (10) and the protrusion (18) are designed as one piece.

13. Electrical machine with a stator comprising end windings with at least one conductor (16), wherein

    an isolation ring (10) according to one of the proceeding claims is arranged on the end windings, and
    the end of the conductor (16) is guided in the conductor guide (14), and
    the inner guiding surface (20) of the pressing flap (18) presses the end of the conductor against the temperature sensor.

Patentansprüche

1. Isolationsring (10) zum Isolieren der Wicklungsköpfe eines Stators einer elektrischen Maschine, umfassend mindestens einen Vorsprung (12) mit einer Leiterführung (14) zum Aufnehmen eines Leiters (16) einer Wicklung des Stators,
wobei der Vorsprung (12) umfasst

   eine Drucklasche (18) mit einer inneren Führungsfläche (20), und
   einen Hohlraum (22), wobei ein Temperatursensor (24) in dem Hohlraum (22) angeordnet ist, und wobei
   die innere Führungsfläche (20) der Drucklasche (18) dem Hohlraum (22) zugewandt ist, und die Drucklasche (18) und der Hohlraum (22) derart ausgestaltet und angeordnet sind, dass ein in die Leiterführung (14) eingesetztes Leiterende (32) des Leiters (16) zumindest teilweise zwischen der inneren Führungsfläche (20) und dem Temperatursensor (24) geführt ist,
   wobei das Leiterende (32) gegen den Temperatursensor (24) gedrückt wird und/oder zu diesem geführt wird.

2. Isolationsring nach Anspruch 1, **dadurch gekennzeichnet, dass** die innere Führungsfläche (20) zumindest teilweise in Bezug auf die Führungsrichtung der Leiterführung (14) geneigt ist.

3. Isolationsring nach Anspruch 1 oder 2, **dadurch gekennzeichnet, dass** die Neigung der inneren Führungsfläche (20) in Bezug auf die Führungsrichtung des Leiters zwischen $0{,}5° \leq \theta \leq 15°$, vorzugsweise zwischen $0{,}5° \leq \theta \leq 10°$ und weiter bevorzugt zwischen $0{,}5° \leq \theta \leq 5°$ liegt.

4. Isolationsring nach einem der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** der Hohlraum (22) einen Hohlraumboden (42) umfasst, der der inneren Führungsfläche (20) zugewandt ist, wobei der Hohlraumboden (42) eine Neigung umfasst.

5. Isolationsring nach Anspruch 4, **dadurch gekennzeichnet, dass** die Neigung des Hohlraumbodens (42) sich von der Neigung der inneren Führungsfläche (20) der Drucklasche (18) unterscheidet.

6. Isolationsring nach Anspruch 4, **dadurch gekennzeichnet, dass** die Neigung des Hohlraumbodens (42) der Neigung der inneren Führungsfläche (20) der Drucklasche (18) entspricht.

7. Isolationsring nach einem der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** der Temperatursensor (24) in dem Hohlraum (22) durch eine formschlüssige Verbindung, eine kraftschlüssige Verbindung und/oder eine kohäsive Verbindung (25) angeordnet ist.

8. Isolationsring nach einem der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** die Höhe des Temperatursensors (24) in einer Richtung senkrecht zu der Führungsrichtung der Leiterführung (14) größer als die Tiefe des Hohlraums (22) ist.

9. Isolationsring nach einem der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** der Vorsprung (12) in einem Längsschnitt eine U-förmige Bauform umfasst, die einen längeren senkrechten Stab (36), der mit dem Isolationsring (10) verbunden ist, und einen kürzeren senkrechten Stab (38), der zu dem Isolationsring (10) beabstandet ist, aufweist, wobei der längere senkrechte Stab (36) den Hohlraum (22) an seiner dem kürzeren senkrechten Stab (38) zugewandten Innenseite umfasst, und der kürzere senkrechte Stab (38) als die Drucklasche (18) ausgestaltet ist.

10. Isolationsring nach einem der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** der Vorsprung (12) mindestens eine erste Vertiefung (26) und eine zweite Vertiefung (28) an seinem distalen Ende in axialer Richtung des Isolationsrings (10) umfasst.

11. Isolationsring nach Anspruch 10, **dadurch gekennzeichnet, dass** die Drucklasche (18) zwischen der ersten Vertiefung (26) und der zweiten Vertiefung (28) angeordnet ist.

12. Isolationsring nach einem der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** der Isolationsring (10) und der Vorsprung (18) als ein Teil ausgestaltet sind.

13. Elektrische Maschine mit einem Stator, der Wicklungsköpfe mit mindestens einem Leiter (16) umfasst, wobei

   ein Isolationsring (10) nach einem der vorhergehenden Ansprüche an den Wicklungsköpfen angeordnet ist, und
   das Ende des Leiters (16) in der Leiterführung (14) geführt ist, und
   die innere Führungsfläche (20) der Drucklasche (18) das Ende des Leiters gegen den Temperatursensor drückt.

Revendications

1. Anneau d'isolation (10) pour isoler les enroulements d'extrémité d'un stator d'une machine électrique, comprenant au moins une saillie (12) avec un guide

de conducteur (14) pour recevoir un conducteur (16) d'un enroulement du stator, la saillie (12) comprenant

un rabat de pression (18) avec une surface de guidage interne (20), et
une poche (22), un capteur de température (24) étant agencé dans la poche (22), et
la surface de guidage interne (20) du rabat de pression (18) faisant face à la poche (22), et le rabat de pression (18) et la poche (22) étant conçus et agencés de telle sorte qu'une extrémité de conducteur (32) du conducteur (16), insérée dans le guide de conducteur (14), soit au moins partiellement guidée entre la surface de guidage interne (20) et le capteur de température (24), l'extrémité de conducteur (32) étant pressée contre et/ou guidée vers le capteur de température (24).

2. Anneau d'isolation selon la revendication 1, **caractérisé en ce que** la surface de guidage interne (20) est au moins partiellement inclinée par rapport à la direction de guidage du guide de conducteur (14).

3. Anneau d'isolation selon la revendication 1 ou 2, **caractérisé en ce que** l'inclinaison de la surface de guidage interne (20) par rapport à la direction de guidage du conducteur est comprise entre $0{,}5° \leq \theta \leq 15°$, préférablement entre $0{,}5° \leq \theta \leq 10°$, et plus préférablement entre $0{,}5° \leq \theta \leq 5°$.

4. Anneau d'isolation selon l'une des revendications précédentes, **caractérisé en ce que** la poche (22) comprend un fond de poche (42), faisant face à la surface de guidage interne (20), le fond de poche (42) comprenant une inclinaison.

5. Anneau d'isolation selon la revendication 4, **caractérisé en ce que** l'inclinaison du fond de poche (42) est différente de l'inclinaison de la surface de guidage interne (20) du rabat de pression (18).

6. Anneau d'isolation selon la revendication 4, **caractérisé en ce que** l'inclinaison du fond de poche (42) correspond à l'inclinaison de la surface de guidage interne (20) du rabat de pression (18).

7. Anneau d'isolation selon l'une des revendications précédentes, **caractérisé en ce que** le capteur de température (24) est agencé dans la poche (22) par un raccord par complémentarité de forme, un raccord par ajustement serré et/ou un raccord cohésif (25).

8. Anneau d'isolation selon l'une des revendications précédentes, **caractérisé en ce que** la hauteur du capteur de température (24) est supérieure à la profondeur de la poche (22) dans une direction perpendiculaire à la direction de guidage du guide de conducteur (14).

9. Anneau d'isolation selon l'une des revendications précédentes, **caractérisé en ce que** la saillie (12) comprend une conception en forme de U dans une section longitudinale, ayant une barre verticale plus longue (36) raccordée à l'anneau d'isolation (10) et une barre verticale plus courte (38) espacée de l'anneau d'isolation (10), la barre verticale plus longue (36) comprenant la poche (22) sur son côté interne faisant face à la barre verticale plus courte (38), et la barre verticale plus courte (38) étant conçue comme rabat de pression (18).

10. Anneau d'isolation selon l'une des revendications précédentes, **caractérisé en ce que** la saillie (12) comprend au moins un premier évidement (26) et un deuxième évidement (28) au niveau de son extrémité distale dans la direction axiale de l'anneau d'isolation (10).

11. Anneau d'isolation selon la revendication 10, **caractérisé en ce que** le rabat de pression (18) est agencé entre le premier évidement (26) et le deuxième évidement (28).

12. Anneau d'isolation selon l'une des revendications précédentes, **caractérisé en ce que** l'anneau d'isolation (10) et la saillie (18) sont conçus d'une seule pièce.

13. Machine électrique avec un stator comprenant des enroulements d'extrémité avec au moins un conducteur (16), dans laquelle

un anneau d'isolation (10) selon l'une des revendications précédentes est agencé sur les enroulements d'extrémité, et
l'extrémité du conducteur (16) est guidée dans le guide de conducteur (14), et
la surface de guidage interne (20) du rabat de pression (18) presse l'extrémité du conducteur contre le capteur de température.

FIG 1

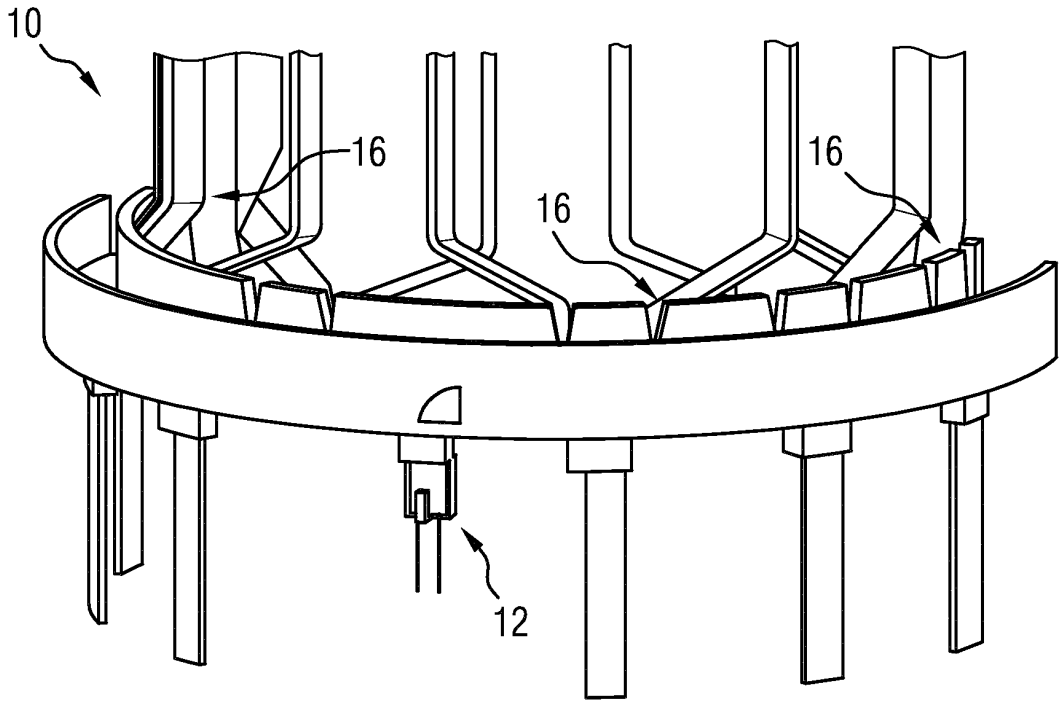


FIG 2

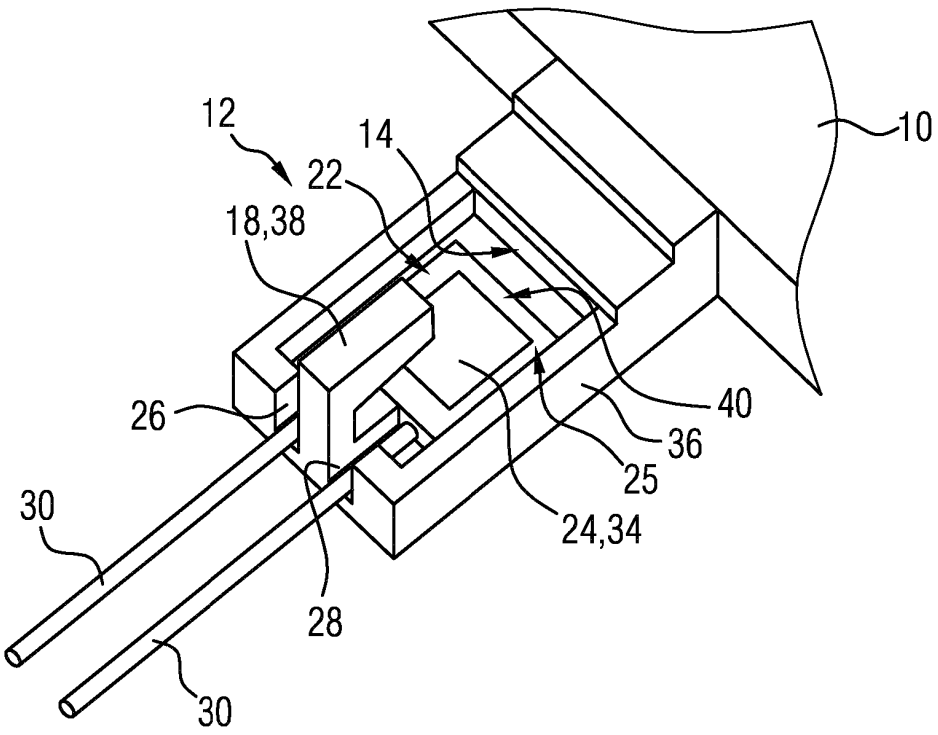


FIG 3

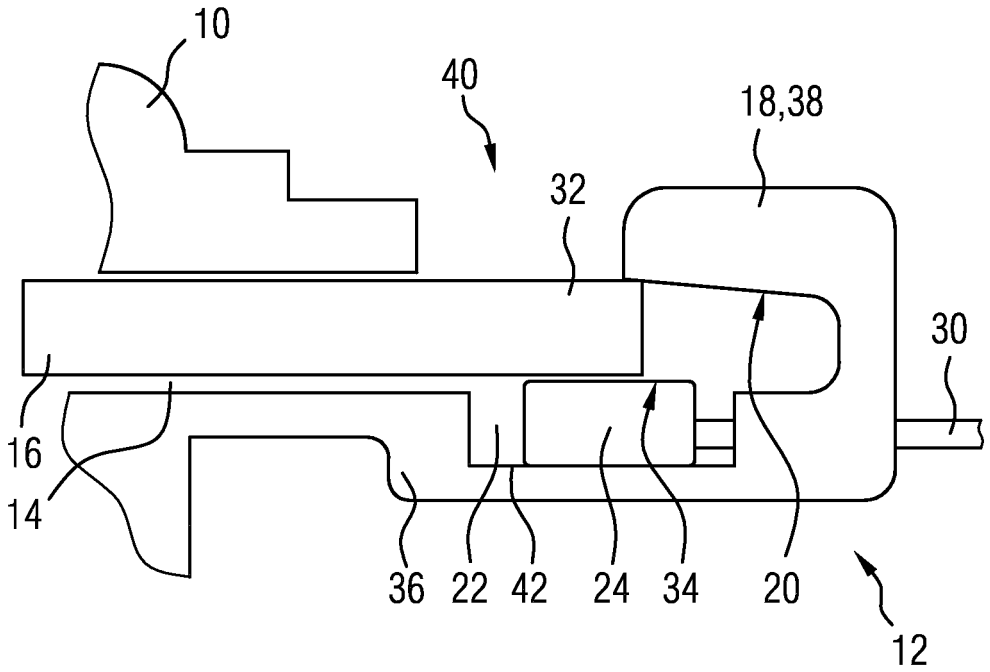

10
40
18,38
32
30
16
14
36
22
42
24
34
20
12

FIG 4

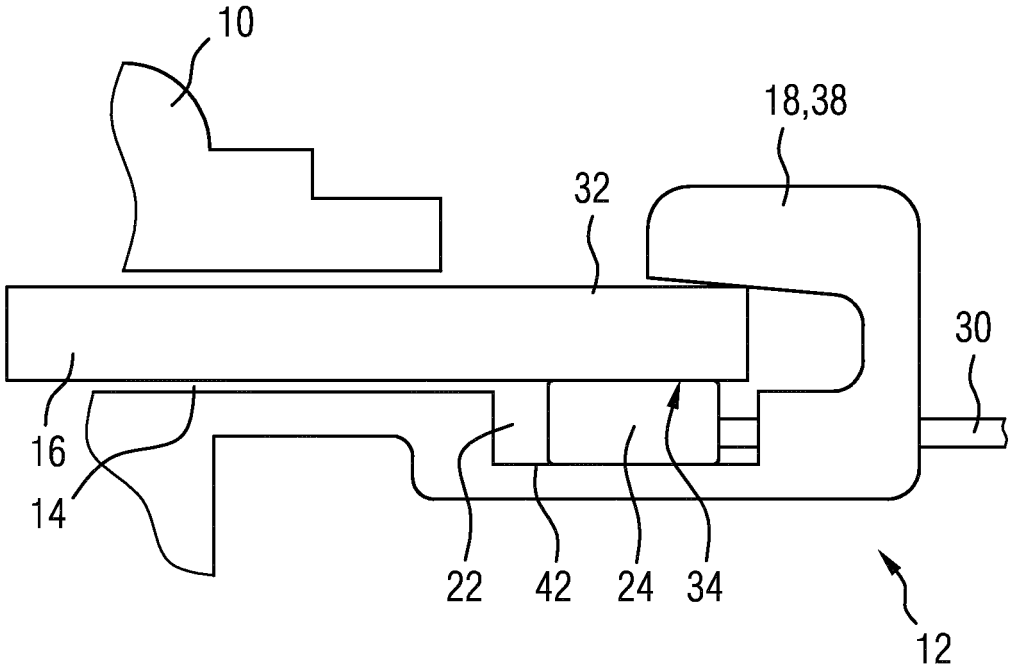

10
18,38
32
30
16
14
22
42
24
34
12

FIG 5

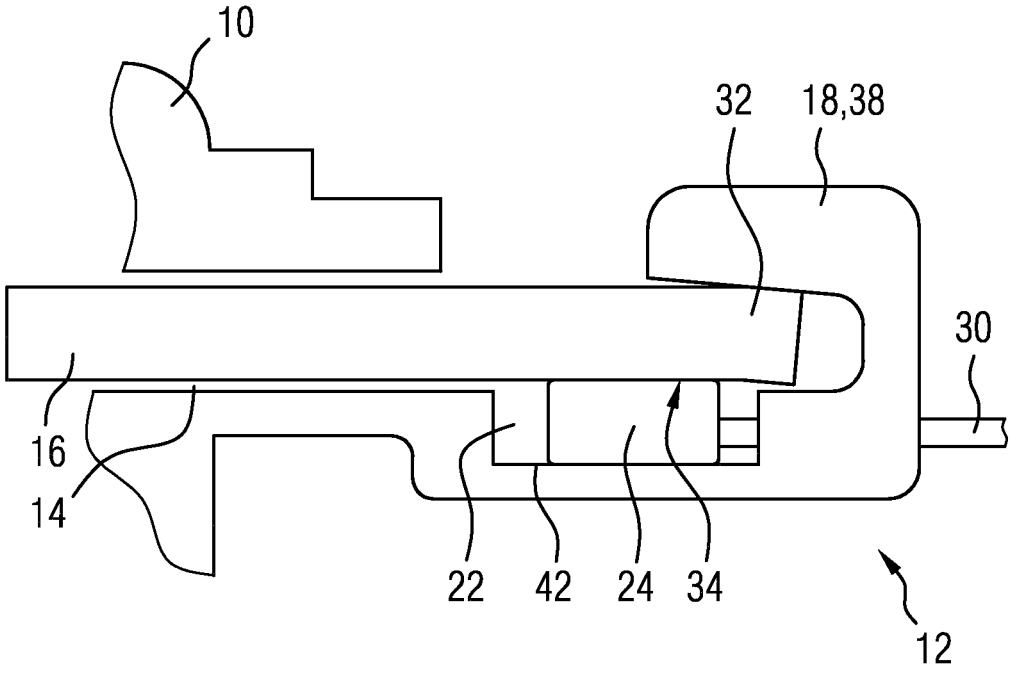
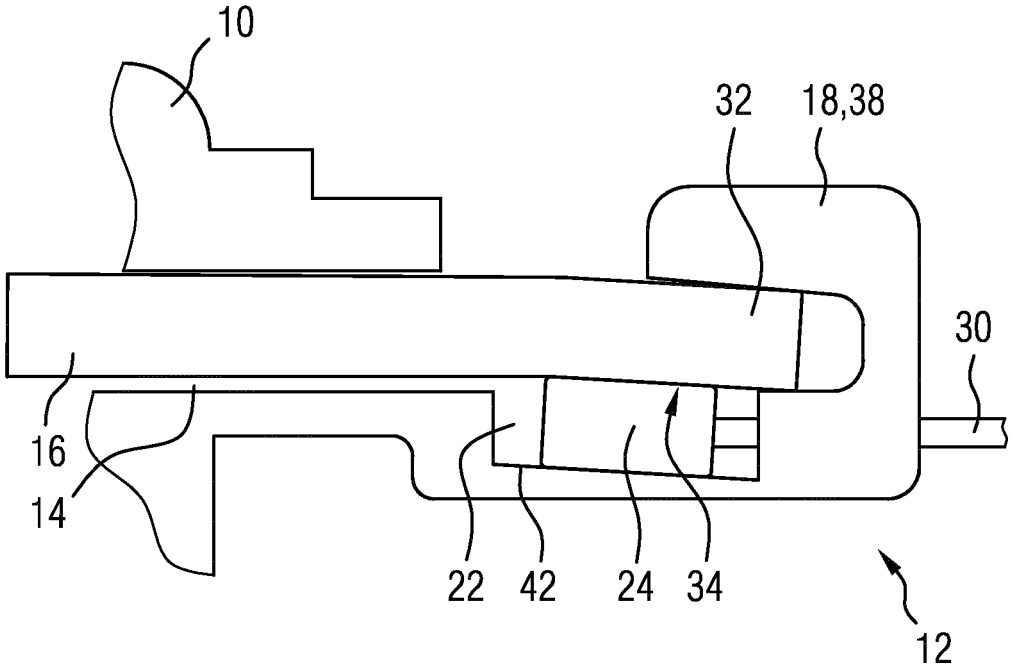


FIG 6



REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

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